

## CLAIMS

What is claimed is:

1. A device for modulating a carrier signal comprising:

(a) a mapper generating a first data signal at a selected one of a plurality of baud rates;

(b) a scaler multiplying the first data signal by one of a plurality of predetermined scaler values selected to correspond to the baud rate to generate a scaled data signal;

(c) a complex mixer for generating a frequency shifting scaled data signal;

(d) an upsampler circuit for increasing the sampling frequency of the frequency shifted scaled data signal; and

(e) a pulse shaper circuit for generating a digital representation of a modulated carrier signal in accordance with the frequency shifted scaled data signal.

2. The device for modulating a carrier signal of claim 1, wherein the first data signal comprises an I-channel first data signal and a Q-channel first data signal, the scaled data signal comprises an I-channel scaled data signal and a Q-channel scaled data signal, and the frequency shifted scaled data signal comprises an I-channel frequency shifted scaled data signal and a Q-channel frequency shifted scaled data signal.

3. The device for modulating a carrier signal of claim 2, wherein the first data signal is a digital data signal with a sampling frequency corresponding to the highest of the plurality of baud rates.

4. The device for modulating a carrier signal of claim 3, wherein each of the predetermined scaler values is a value which provides for the scaled data signal to have approximately the same signal strength independent of baud rate.

1 5. The device for modulating a carrier signal of claim 4, wherein the complex  
2 mixer includes:

3 (i) a first multiplier and a second multiplier each multiplying the I-  
4 channel scaled data signal by a sine waveform and a cosine waveform  
5 respectively;

6 (ii) a third and fourth multiplier each multiplying the Q-channel  
7 scaled data signal by the sine waveform and a cosine waveform respectively;

8 (iii) a first summer adding the result of the second multiplier to the  
9 result of the third multiplier multiplied by negative one to generate the I-  
10 channel frequency shifted scaled data signal; and

11 (iv) a second channel summer adding the result of the first multiplier  
12 and the result of the fourth multiplier to generate the Q-channel frequency  
13 shifted scaled data signal.

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1 10. The device for modulating a carrier signal of claim 9, wherein the finite  
2 impulse response filter is a 16 tap finite impulse filter and each set of filter  
3 coefficients includes 9 non-zero coefficients, each coefficient being a 10 bit  
4 coefficient.

5  
1 11. A method for modulating a carrier signal, the method comprising:

- 2 (a) generating a first data signal at a selected one of a plurality of baud  
3 rates;  
4 (b) scaling the first data signal by one of a plurality of predetermined scaler  
5 values selected to correspond to the baud rate to generate a scaled data signal;  
6 (c) mixing the scaled data signal with a frequency signal to generate a  
7 frequency shifted scaled data signal;  
8 (d) increasing the sampling frequency of the frequency shifted scaled data  
9 signal; and  
10 (e) filtering the frequency shifted scaled data signal to generate a digital  
11 representation of a modulated carrier signal.

12  
1 12. The method for modulating a carrier signal of claim 11, wherein the step of  
2 generating the first data signal comprises generating an I-channel first data signal  
3 and a Q-channel first data signal, the step of scaling the first data signal comprises  
4 scaling the I-channel first data signal and the Q-channel first data signal, and the  
5 step of mixing the scaled data signal includes complex mixing of both the I-channel  
6 scaled data signal and the Q-channel scaled data signal.

7  
1 13. The method for modulating a carrier signal of claim 12, wherein the first data  
2 signal is a digital data signal with a sampling frequency corresponding to the highest  
3 of the plurality of baud rates.  
4

1 14. The method for modulating a carrier signal of claim 13, wherein each of the  
2 predetermined scaler values is a value which provides for the scaled data signal to  
3 have approximately the same signal strength independent of baud rate.  
4

1 15. The method for modulating a carrier signal of claim 14, wherein the step of  
2 complex mixing the scaled data signal includes:

3 (i) subtracting the result of the Q-channel scaled data signal  
4 multiplied by a sine waveform from the result of the I-channel scaled data  
5 signal multiplied by a cosine waveform to generate an I-channel frequency  
6 shifted data signal; and

7 (ii) adding the result of the Q-channel scaled data signal multiplied  
8 by a cosine waveform from the result of the I-channel scaled data signal  
9 multiplied by a sine waveform to generate a Q-channel frequency shifted data  
10 signal.  
11

1 16. The method for modulating a carrier signal of claim 15, wherein the sine  
2 waveform and the cosine waveform each have a frequency of one fourth the  
3 sampling frequency.  
4

1 17. The method for modulating a carrier signal of claim 16, wherein the step of  
2 filtering the frequency shifted scaled data signal includes 16 tap finite impulse  
3 response filtering utilizing a set of predetermined filter coefficients for each of the I-  
4 channel and the Q-channel.  
5

1 18. The method for modulating a carrier signal of claim 17, wherein the plurality of  
2 baud rates are 2 Mbaud and 4 Mbaud and the sampling frequency is 4 MHz.  
3

1 19. The method for modulating a carrier signal of claim 18, wherein the  
2 predetermined scaler values are a value of 1 corresponding to the 2 Mbaud baud

3 rate and a value of  $2/3$  corresponding to the 4 Mbaud baud rate.

4 complex

5

1 20. The method for modulating a carrier signal of claim 19, wherein each set of  
2 filter coefficients includes 9 non-zero coefficients, each coefficient being a 10 bit  
3 coefficient.

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